

Maine High School Assessment Mathematics Augmentation Additional Indicators  
Maine *Learning Results* Performance Indicators that do not Appear  
or Rarely Appear on the SAT Mathematics Reasoning™ Test

Cluster One Numbers and Operations

A. NUMBERS AND NUMBER SENSE

2. Explain what complex numbers (real and imaginary) mean and describe some of their many uses.

B. COMPUTATION

2. Explain operations with number systems other than base ten.

I. DISCRETE MATHEMATICS

1. Use linear programming to find optimal solutions to a system.
2. Use networks to find solutions to problems.
4. Use matrices as tools to interpret and solve problems.

Cluster Two Shape and Size

E. GEOMETRY

1. Draw coordinate representations of geometric figures and their transformations.
3. Apply trigonometry to problem situations involving triangles and periodic phenomena.

F. MEASUREMENT

1. Use measurement tools and units appropriately and recognize limitations in the precision of the measurement tools.

Cluster Three Mathematical Reasoning

C. DATA ANALYSIS AND STATISTICS

3. Demonstrate an understanding of concepts of standard deviation and correlation and how they relate to data analysis.
4. Demonstrate an understanding of the idea of random sampling and recognition of its role in statistical claims and designs for data collection.
5. Revise studies to improve their validity (e.g., in terms of better sampling, better controls, or better data analysis techniques).

D. PROBABILITY

1. Find the probability of compound events and make predictions by applying probability theory.
2. Create and interpret probability distributions.

J. MATHEMATICAL REASONING

1. Analyze situations where more than one logical conclusion can be drawn from data presented.

## **Cluster One Indicators – Suggested Item Parameters**

### **A2. Explain what complex numbers (real and imaginary) mean and describe some of their many uses.**

Identify equations with non-real solutions or graphs with no real roots.

Perform simple complex number calculations, including using complex conjugates.

### **B2. Explain operations with number systems other than base ten.**

Perform computations with measurement systems that require working in different bases, even if the numbers are written in base ten.

Work in modulo arithmetic systems and compute in different bases.

### **I1. Use linear programming to find optimal solutions to a system.**

Given a feasible region, identify maximum or minimum values for a given equality.

Match feasible regions with constraint inequalities.

Match a situation with the constraint inequalities.

### **I2. Use networks to find solutions to problems.**

Be familiar with Euler circuits and paths even though these terms may not appear.

Apply network models to practical situations.

### **I4. Use matrices as tools to interpret and solve problems.**

Recognize matrix form for solving a given system of equations or solve systems written in matrix form.

Match practical situations with matrix representations.

Do computations with matrices (non-tedious) and be able to work backwards.

## **Cluster Two Indicators – Suggested Item Parameters**

### **E1. Draw coordinate representations of geometric figures and their transformations.**

Identify the coordinates of a point or identify a point given its coordinates.

Identify a figure or give the coordinates of a point after a transformation. Transformations include reflections across a line, rotations about a point, dilations about a point and translations.

### **E3. Apply trigonometry to problem situations involving triangles and periodic phenomena.**

Solve for missing sides of triangles.

Compare the size of different trigonometric ratios for an angle or range of angles.

Apply an understanding of periodic functions or periodic phenomena.

### **F1. Use measurement tools and units appropriately and recognize limitations in the precision of the measurement tools.**

Choose the correct tool for a measurement.

Choose the correct unit for a measurement.

Establish intervals for a measure given a reported result and the level of precision for the measurement tool.

## **Cluster Three Indicators – Suggested Item Parameters**

### **C3. Demonstrate an understanding of concepts of standard deviation and correlation and how they relate to data analysis.**

Apply concepts of standard deviation (computation of standard deviation not required) including ranking data sets based on standard deviation and recognizing how a change in a data set will affect the standard deviation.

Recognize the relationship, but non-equivalence of correlation and causation.

Make conclusions about strength of correlations and positive and negative correlations.

### **C4. Demonstrate an understanding of the idea of random sampling and recognition of its role in statistical claims and designs for data collection.**

Rank sampling methods based on the level of randomness.

Recognize that if one does not know a sampling method, one can have little confidence in statistics for a sample.

### **C5. Revise studies to improve their validity (e.g., in terms of better sampling, better controls, or better data analysis techniques).**

Identify problematic aspects of a study and identify possible ways to improve the study.

### **D1. Find the probability of compound events and make predictions by applying probability theory.**

Solve problems involving repeated or compound events including independent and dependent events.

### **D2. Create and interpret probability distributions.**

Read graphically displayed distributions and make interpretations based on the distributions.

Know basic characteristics of the normal distribution: the mean, median and mode are the same; approximately 67% of the data are within +/- 1 standard deviation of the mean and 95% within +/- 2 standard deviations of the mean, and the "bell shape".

### **J1. Analyze situations where more than one logical conclusion can be drawn from data presented.**

Distinguish between multiple logical conclusions based on a situation and those conclusions that are not logical. These items require higher order thinking.